



# DESCARTES .

## AN OUTLINE OF HIS PHILOSOPHY.

S. GANGULI, M. A.

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AN OUTLINE OF HIS PHILOSOPHY.



# DESCARTES : IN OUTLINE OF HIS PHILOSOPHY.

BY

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TO  
THE MOST REVEREND  
JAMES E. C. WELLDON, M. A., D. D., LITT. D.;  
LORD BISHOP OF CALCUTTA AND METROPOLITAN IN INDIA  
AND THE ISLAND OF CEYLON,  
IN HIGH ADMIRATION OF HIS LORDSHIP'S BROAD SYMPATHIES, WIDE  
TOLERATION, AND KEEN INTEREST IN MORAL AND  
INTELLECTUAL CULTURE,  
THIS SHORT TREATISE  
IS, WITH HIS LORDSHIP'S KIND PERMISSION, MOST RESPECTFULLY  
AND GRATEFULLY DEDICATED BY  
THE AUTHOR



## PREFACE.

In the following pages is given a succinct statement and exposition of the chief philosophical doctrines of Descartes, the recognised father and originator of modern European philosophy. The philosophical evolutions of the succeeding generations were mainly influenced by him, either by way of adherence or of antagonism. From him do the different schools of Idealism and Pantheism, of Empiricism and Scepticism, of Dogmatism and Intuitionism, directly or indirectly, take their rise. It is not, however, within the scope of this short treatise to trace the vast and diverse influences of the Cartesian system on the developments of the various philosophies of Europe that owe their origin to it. The aim of this book, as its title would indicate, is a modest one. It is an attempt to give a clear and broad outline and a brief estimate of the chief speculations of Descartes. I have to acknowledge my general

obligations to Prof. Veitch's translations of Descartes' works, and to Prof. Mahaffy's monograph on Descartes in the Philosophical Classics series. I also take, with great pleasure, this opportunity of tendering my hearty thanks to the Rev. G. Macalister, M. A., D. D., for his ever kind and friendly assistance in revising the manuscript and making many valuable suggestions for its improvement.

JAIPUR :  
September, 1900. }

S. GANGULI.

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This Treatise on the Philosophy of Descartes is an excellent book to put into the hands of any one studying mental science, who wishes to get a knowledge of the Cartesian Philosophy. It gives a very fair account of that Philosophy. Mr. Ganguli's knowledge of English is admirable, he is never at a loss to express the most abstruse ideas in that language.

G. MACALISTER, D. D.

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# DESCARTES: AN OUTLINE OF HIS PHILOSOPHY.

## INTRODUCTION.

### THE LIFE OF DESCARTES

Rene Descartes, the founder of modern philosophy, was born of a noble French family on 31st March 1596 at La Haye in the province of Touraine. In 1604 he was sent for his education to the Jesuit College at La Fleche, then newly established by Henry IV of France. The studies of this place were of a distinctly scholastic character, and for eight years Descartes learnt here the languages, poetry, rhetoric, logic, physics, metaphysics and mathematics. In 1613, at the age of seventeen, he left college and went to Paris, where for a short time he indulged in the gayer amusements of youth. But he soon withdrew himself from these lighter frivolities, and for two years shut himself up in a secluded house, and seriously applied himself to mathematical studies in which he greatly excelled in a short time. In 1617, at the age of twenty-one, he took to military service as a volunteer, not so much for love of war or any particular military taste, but for seeing the world at large and studying the manners and customs of various nations. He entered the army of the

Netherlands under Prince Maurice of Nassau, the son of Prince William of Orange, and joined his garrison at Breda. Here he made the acquaintance of a learned mathematician, Isaac Beeckman, Principal of the College at Dort, by a curious incident. One day a difficult mathematical problem had been posted by some body in the public streets with a challenge for its solution. Descartes, who could not understand the Flemish language in which it was written, asked a bystander, who happened to be no other than Beeckman himself, to translate it for him. Beeckman did so and sarcastically invited Descartes to find out its solution. Next day Descartes brought the solution to Beeckman, and thus grew up a close friendship between them. While at Breda, he in 1618 wrote a treatise on *Music* for Beeckman, which was, however, not published. He next served in the army of the Duke of Bavaria. While in the winter quarters at Neuburg, a faint glimpse of his universal method first dawned upon his mind, which, years after, he elaborated and explained in his *Discourse on Method*. He soon quitted his military life, that he might entirely devote himself to science and philosophy. In 1622, he returned to France to settle his private affairs and provide himself with an independent income by the sale of his landed property. He next set out to make an extensive tour of most of the countries of Europe, after the completion of which he returned to Paris, where, from 1626 to 1628, he lived in the society of brilliant men of letters and science. But the distractions of the fashionable Parisian society, to which his good social position often exposed him, were unsuited for the maturity of his philosophy. With a view, therefore, to pursue his philosophical speculations without interruption, and also escape the Catholic persecution which his new way of thinking was sure to raise against him, he, in

1629, at the age of thirty, retired to Holland—then considered the greatest stronghold of freedom, religious, civil, as well as literary. For a few months he busied himself with the study of metaphysics, but he soon turned his attention to optics, anatomy, chemistry, astronomy, and other sciences. In 1632-33 he was engaged in utilising the materials of his researches in writing a treatise, *The World*, in which he attempted an *a priori* explanation of the physical sciences, and asserted among other things the motion of the earth round the sun. But the condemnation of Galileo by the Pope for a similar doctrine so frightened him that he could not by any means be induced to publish his treatise for fear of incurring the hostilities of the Church. It was only after his death that fragments of it, including *Le Monde*, or a treatise on light, were published in 1654. In 1637, he, however, published at Leyden his famous work, '*Discourse on Method of properly guiding the Reason in the research of Truth in the Sciences*', to which he appended three other treatises,—(1) the *Dioptric* dealing with mathematical physics, (2) the *Meteors* with pure physics, and (3) the *Geometry* with pure mathematics,—as illustrations of the application of the method in the case of particular sciences. The publication of this treatise marks an era in the development of human thought. From it really dates the modern philosophy of Europe. "The *Discourse on Method*," says Prof. Mahaffy, "was the trumpet-note for the resurrection of the human mind from the death of formalism. It produced an electric shock throughout the learned world, which no other work of the kind ever did in the history of philosophy"<sup>1</sup>. In 1641 he published at Paris his another

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1. Mahaffy's *Descartes*, Philosophical Classics series, p. 70.

most important work, '*The Meditations concerning the First Philosophy in which are demonstrated the existence of God and the Immortality of the Soul*', at the end of which he added the *Objections* of various savants against his doctrines together with his own *Replies*. His bold and original speculations gave rise to violent opposition, especially from the side of theology. He was attacked as an atheist and a freethinker, not only by the Protestant Calvinists, but also by the Jesuits whom he always tried to conciliate. The years 1641-43 were passed in bitter controversies with one, Voet, the Protestant Calvinist Rector of the University of Utrecht, who tried to exclude Descartes' theories from the University teaching. Tired and annoyed by the misrepresentations and misunderstandings of his doctrines in the Utrecht controversy, Descartes thought of placing before the public a complete and systematic exposition of his philosophy, and to that effect he published the *Principles of Philosophy* in 1644. Passing briefly over the conclusions arrived at in the *Meditations*, it deals in its second, third, and fourth parts with the general principles of physical science, especially the laws of motion, with the theory of vortices, and with the phenomena of heat, light, gravity, magnetism, electricity, &c., upon the earth. In 1646 he wrote his treatise *On the Passions of Man*, but it was published only in 1649 at the earnest request of a friend. In 1649, being invited by Queen Christiana of Sweden, he went to Stockholm, where he died of the inflammation of lungs in 1650. His treatise *On Man and the Formation of Fætus*, which was nearly ready for publication before his death, was posthumously published at Paris in 1654.

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## CHAPTER I.

### DESCARTES' METHOD.

**Method.**—Descartes' *Discourse de la Method* is a unique autobiography and epoch-making treatise disclosing the stages of his mental development in the search after truth. He became quite dissatisfied with the existing philosophies and studies of his time. He, therefore, set himself to find out a universal method of enquiry, which might be applied to the investigation of all the branches of knowledge and science. His method begins with methodical doubt or absolute questioning of everything that can be doubted, in order to reach an indubitable truth after exhausting the sphere of doubting. It must be remembered that he advocates universal doubt not as an end, as a sceptic would do, but as a means to discharge his mind of all preconceived ideas, so that he may attain to an undoubted fact in consciousness, from which afterwards he has to construct his philosophy on mathematical certitude or demonstration. (Descartes has laid down four rules of his method which must be followed to reach apodictic certainty. The first is to admit nothing as true which cannot be presented to consciousness as clearly and distinctly as to exclude all grounds of doubt thus establishing clearness and distinctness of ideas as the test and criterion of truth. The second, to divide every object inquired into as much as possible into its natural parts (Analysis). The third, to ascend from simple ideas and cognitions to those that are more complex (Syn-

thesis). And the last, by careful and repeated enumeration, to see that all the parts are reunited.) Descartes also adds that certain ethical rules enjoining adherence to received religions and customs, moderation and consistency, self-culture, &c., have to be previously adopted. (Descartes' method, thus beginning with doubt as a tentative exercise, proceeds by analysis and synthesis, and accepts evidence in proportion as it resembles the evidence of self-consciousness in clearness and distinctness.)

Remarks.—The above gives briefly Descartes' famous discovery of the principal rules of his new logical method of philosophising, which teaches the right conduct of reason with a view to discover the truths we are ignorant of. It was meant to supersede the Aristotelian syllogism of the scholastic logic, which could merely set forth in proof or refutation that which was already known, but was of no avail in the investigation of the unknown. It was also to replace the new method of scientific induction and experimental philosophy, which consisted in the mere observation and systematising of the facts of experience. Descartes' method presupposes that there is always a fundamental element in every object of our knowledge, which is known by its intuitive and elementary character, and which explains the rest of it. "All things, to the knowledge of which man is competent, are mutually connected, and there is nothing so far removed from us as to be beyond our reach, or so hidden that we cannot discover it, provided only we abstain from accepting the false for the true, and always reserve in our thoughts the order necessary for the deduction of one truth from another" <sup>1</sup>

1. Descartes' *Discourse on Method*, Veitch's edition, p 19.

Descartes' great logical reform consisted in making the ultimate testimony of consciousness the sole criterion of truth or reality. The method of introspection thus introduced is the touch-stone of modern philosophy, distinguishing it from ontological and pamphysical, from ancient as well as medieval systems of philosophy. "Henceforth the path that philosophy follows is not to reach self by starting from the world or from God, but to start from self and find one's way back to a world and to God."<sup>1</sup>

Is his method synthetic or analytic?—Descartes' chief aim was to combine the logical with the mathematical methods, and thus make his philosophy a universal mathematics. Corresponding to the mathematical axioms and postulates, he was to discover in philosophy a single principle of the highest and absolute certainty, which he arrives at by a thorough analysis of the object of knowledge. This principle is known by its intuitive and elementary character, and it serves as the starting-point for the explanation of the whole compass of experience. "Descartes will, then, by an inductive enumeration and a critical sifting of all ideas, press forward to a single, certain point, in order from this point to deduce all further truths."<sup>2</sup> Such a point he gains, by the analytic method, in self-consciousness, from which he afterwards proves the existence of God and of the material universe. His method is therefore partly analytic and partly synthetic. "The philosopher himself desired to see the analytic method employed in a great proportion of instances, even in the case of particular problems, and thought of the synthetic method as a progress in discovery from one intuitive truth to another."<sup>3</sup>

Erdmann's *History of Philosophy*, vol II, p. 2.

Windelband's *History of Philosophy*, p 390

Windelband's *History of Philosophy*, p. 395.

The synthetic process, however, plays such an important part in his philosophy that many critics regard his method as purely deductive or mathematical in its character. "Descartes' philosophy," observes Professor Mahaffy,<sup>1</sup> "was the very opposite of what historians of philosophy have described—it was not a system based on the observation of the facts of consciousness. It was a deductive system, drawn as a mathematician would be sure to frame it, from the fewest possible assumptions. Hence he reaches the external world, not by clear and distinct perceptions, but by a roundabout inference. For he determines, in the first place, to deduce from the fact that we exist as thinking beings the existence of God."

There is, again, a third class of critics who regard his method as analytic, proceeding, as it does, from a datum to the necessary implication of that datum, instead of being synthetical as in the mathematical sciences, where we proceed from abstract first principles to their concrete applications and embodiments. "The intuition of self and its modes," says Professor Veitch,<sup>2</sup> "no doubt involves a great many elements or notions, not obvious at first sight. It involves unity, individuality, substance, relation; it involves identity and difference or discrimination of subject and object, of self and state; it opens up infinite possibilities of knowledge; the reality of man and God can now be grasped in the form of permanency of self-consciousness. These notions or elements analytical reflection will explicitly evolve from the fact, as its essential factors." This class of critics, however, concede that the method may be called mathematical in a larger sense, aiming, as it does, at necessary demonstration of truth.

1. Mahaffy's *Descartes*, Philosophical Classics series, p. 150.

2. Veitch's *Descartes* Introduction, p. xliv.

## CHAPTER II.

### THEORY OF KNOWING.

#### *The existence of the Ego.*

**Cogito ergo sum, the standpoint of philosophy.**—In his search after a posto or standpoint for his philosophy, Descartes starts from universal doubt. He rejects every proposition of which there can be the least ground for doubts. We may doubt the testimony of our senses, as they have been found to mislead men, and as their representations may after all be no better than the illusions of dreams. We may doubt even our reasonings and mathematical demonstrations, as men often fall into errors in such matters, and as it is at least possible to conceive that we have been so created by a malignant and omnipotent Being as ever to be deceived, and that the use of our reasoning is intended by him to lead us only into errors. However much we may thus carry on our doubts, we cannot doubt our doubting or thinking, *i. e.*, we cannot doubt that we doubt or think, for there is a repugnance in conceiving that what thinks does not exist at the very time when it thinks. Doubting involves thinking; and thinking involves the consciousness of self, and doubting that we doubt is suicidal. **Cogito ergo sum**, I think, therefore, I am: *i. e.*, the consciousness of the existence of self or the assurance of mental existence is involved in every conscious act. Descartes thus makes thinking or self-consciousness the starting-point of his inquiry, which henceforth becomes the distinctive mark of modern philosophy.

Ground of the truth of *cogito ergo sum*.—What, it may be asked, is the reason of Descartes' accepting the truth of self-consciousness? Is it merely the clearness and distinctness of perception, which Descartes very often points to, as if they alone are the only grounds of its truth? As he did not as yet establish that the criterion of truth consists in clearness and distinctness of perception, which he did after proving the existence of God, he could not apply that test to the present case. His language on this point, however, is so vague and ambiguous that one is apt to think that he based its truth on the clearness of its perception; and for this reason he has often been charged with arguing in a circle. But if we consistently interpret his system, we may find that he accepts thinking or self-consciousness as the *præsto* of his philosophy, not simply because of the clearness and distinctness of its perception, but because thought posits itself, the very negation of self-consciousness involves its affirmation, its doubt implies its certitude.

*Cogito ergo sum, not a syllogism.*—*Cogito ergo sum*, I think, therefore, I am, is not a syllogism, but a mere statement of a fact or intuition, *viz*—that each thinker is certain of his own existence in being certain of his thought, “The reality of the ‘I’ or ‘ego’ is inseparably bound up with the fact of the definite acts of consciousness. But, be it observed, Descartes does not prove or deduce the ‘ego’ from the act of consciousness; he finds it or realizes it as a matter of fact in and along with this act. The act and the ego are the two inseparable factors of the same fact of experience in a definite time.”<sup>1</sup>

1 Veitch's *Descartes*, Introduction, p. xxii.

**Criticism of *cogito ergo sum*** — The non-syllogistic and intuitive character of '*cogito ergo sum*' is so often overlooked by the critics of Descartes that most of the objections against it arise from this simple misapprehension of its true nature. The word '*ergo*', the usual symbol of inference, has, no doubt, to a certain extent given rise to its misunderstanding by lending to it an apparently syllogistic form. Thus Hobbes and Gassendi attacked this principle as involving a *petitio principii*, inasmuch as the existence of the 'I' or 'ego' is assumed in 'I think,' and so nothing is contained in the conclusion, 'I am,' which was not explicitly given in the premise 'I think.' But these objections altogether fall to the ground when we remember that Descartes did not intend to prove the fact of existence from that of thought, but to state that personal existence consists in consciousness, and that his celebrated principle is not an enthymeme or syllogism, but a simple proposition.

The misrepresentation, however, is still being made, and quite in the same spirit does Prof. Huxley<sup>1</sup> criticise the Cartesian doctrine of '*cogito ergo sum*'. "In the first place, the 'therefore', he says, "has no business there. The 'I am' is assumed in the 'I think', which is simply another way of saying 'I am thinking'. And, in the second place, 'I think', is not one simple proposition, but three distinct assertions rolled into one. The first of these is '*something called I exists*', the second is '*something called thought exists*', and the third is '*the thought is the result of the action of the I*'. The only one of these propositions which can stand the Cartesian test of certainty is the second

<sup>1</sup> Huxley's *Lay Sermons*, Descartes, p. 328.

'It cannot be doubted, for the very doubt is an existent thought. But the first and third, whether true or not, may be doubted, and have been doubted. for the assertor may be asked, how do you know that thought is not self-existent'?

Professor Veitch<sup>2</sup> makes certain pointed remarks on the above criticism, examining it in details, and exposing the weakness and irrelevancy of Huxley's argument, and we cannot do better than reproduce them at length. "The 'therefore' has business there, as seems to me, until it is shown that immediate inference is no inference. The 'I am' is not assumed in the 'I think', but implied in it, and explicitly evolved from it. There are not three distinct assertions first, which have been rolled into one. On the contrary, the meaning and possibility of any assertion whatever are supplied by the 'I think' itself. 'Something called 'I' exists,' is not known to me before I am conscious, but only as I am conscious. It is not a distinct proposition 'Something called thought exists,' is not any more a distinct proposition, for the thought which exists is inseparably *my* thought, and *my* thought is more than the mere abstraction 'thought.' 'The thought is the result of the action of the I,' is not a fair statement of the relation between the 'I' and 'thought,' for there is no 'I' known first or distinct from thought, to whose action I can ascribe thought. The thought is me thinking. And the existence of thought could never be absolutely indubitable to me, unless it were *my* thought, for if it be but thought, this is an abstraction with which 'I' have and can have no relation. 'How do you know that thought is not self-existent?' that is, divorced from me or thinker, for this reason simply, that

such a thought could never be mine, or aught to me or my knowledge. Thought divorced from me or a thinker, would be not so much an absurdity as a nullity."

**The ego always thinking**—We have seen that Descartes found the essence of the ego, soul, mind, reason or intellect, as consisting only in consciousness. For the *res cogitans* or thinking substance, thinking is existence, and existence is thinking. "Thinking is inseparable from me, it is what properly belongs to myself. I exist as often as I think; and if I should wholly cease to think, I should at the same time cease to be."<sup>1</sup> Such a view of mind identifies my consciousness through waking or sleeping. It was to this point that the polemic of Locke was directed, when he pointed out that we have often no recollection of our dreams. But Descartes would explain such forgetfulness by the feebleness of cerebral impressions and the defect of memory. What wonder is it, he asks, that we do not always remember the thoughts of our sleep or lethargy, when we often do not remember the thoughts of our waking hours?

**The ideatum; a metaphysical assumption**—After establishing the existence of self or thinking substance, Descartes goes on to examine its contents or ideas. Ideas may be considered either as mere modes of my own consciousness, or as the consequences of objects independent of me. In the latter case, different ideas have different measures of 'objective' reality—or representative perfection. By 'objective' reality Descartes does not mean the reality of the object itself, which is the present meaning of the term, but only the reality of the re-

1. Descartes' *Meditation II.*, Veitch's ed., p. 107.

presentation in thought. He uses this term in much the same sense as 'subjective reality' bears in modern philosophical language. The absolute independent existence of the thing, the modern sense of objective reality, is expressed by Descartes by the term 'formal' reality. The 'objective reality' or representative perfection (being) of an idea is distinguished from the object of an idea in so far as the latter possesses an absolute existence or existence independent of thought. The object is said to possess an actual or 'formal' reality as opposed to 'objective' reality of the idea. All ideas have not in them the same representative reality. The idea of substance contains in it more 'objective' or representative reality than that of accidents and modes, and the idea of God or infinite substance has more reality in its representation than that of finite substance. Now it is an obvious fact that the *ideatum* or the origin of ideas must 'formally' or actually contain the latter, possibly more, there must at least be as much reality in the cause as in the effect. The 'objective' or representative reality of an idea attests to the 'formal' or actual reality of its total or efficient cause. It cannot be said that the causes have merely 'objective' reality like the ideas, for although an idea may give rise to another idea, this regress cannot nevertheless be infinite; we must, in the end, reach a first idea, which is, as it were, the archetype in which all the reality or perfection, that is found 'objectively' or by representation in these ideas, is contained 'formally' or actually. Here Descartes tacitly makes a metaphysical assumption of the proposition "*ex nihilo nihil fit*," 'nothing can come out of nothing,' which Spinoza considered as fundamental as *cogito ergo sum* in the Cartesian philosophy.

*The existence of God.*

**A' Posteriori** proof, from the idea of God in us — On examining the contents of the mind, there are found in it various sorts of ideas, one of which is the idea of God or an absolutely perfect Being, independent, all powerful, all-knowing and infinite. This idea cannot be a copy of my ego, as I know myself to be imperfect, limited, finite and dependent. It is not an abstraction from, or negation of, my own finitude. A negative infinite is only the indefinite. But here we have the perfectly positive conception of the infinite, of which the finite must rather be called the negative. As the *ideatum* or the origin of an idea must formally, (*i. e.* actually) contain in it all the perfections that are contained in the idea itself, the cause of the idea of the infinite must be an actually Infinite Being Hencé the existence of the idea of the infinite in myself is a proof that there is actually an Infinite Being or God outside of myself who had implanted that idea in me

**Cosmological** proof, as the cause of my existence — I who possess the idea of God or infinitely perfect Being, could not exist or be conserved at any moment, if there were no God. I cannot be the author of myself: for, if I were, I would have bestowed upon myself every perfection of which I possess the idea. Moreover, God can only be the adequate cause of my being conserved at every moment. To be maintained in existence is to be continually created. "The whole time of my life may be divided into an infinity of parts each of which is in no way dependent on, or co-existent with, any other, and accordingly from the fact that I now am, it does not necessarily follow that I shall be a moment afterwards, unless some cause, *viz.*, that which first produced me, shall, as it were, continually

create me anew—that is, conserve me at every moment".<sup>1</sup> Now, if I were the author of myself, I would certainly have possessed the power of conserving myself at every moment, and, as a thinking substance, would have been conscious of such a power: But I am not conscious of any such power in me. So I cannot be the cause of my own existence. Neither my parents nor any other causes less perfect than the Deity can be supposed to be the author of myself for, since I have an idea of God, the cause of my existence must possess in itself the idea and all those perfections I attribute to the Deity. As regards my parents, even if I think that I was produced by them in so far as I am a thinking being, it does not nevertheless follow that I am continually conserved by them. None but a self-existent God can conserve me at every moment. Lastly, it cannot be supposed that several concurrent causes produced me, from each of which, I received one or other of the perfections I attribute to the Deity, though they do not all exist together in a single being who is God, for, the unity and inseparability of all the properties of the Deity is one of the chief perfections I conceive him to possess. Thus, the very existence of myself, as well as my conservation at every moment, proves the existence of God.

**A' Priori or ontological proof**—The a' priori proof, the most important of Descartes' proofs of the existence of God, consists in showing that necessary existence is comprised in the very idea we have of God as the most perfect Being. He cannot be thought of as such, unless he be also thought of as necessarily existing. "Just as because the equality of its three angles to two right angles is necessarily comprised in the idea of a triangle, the mind is firmly persuaded that the

1. Descartes' *Meditation III.*, Veitch's ed., p. 129.

three angles of a triangle are equal to two right angles, so, from its perceiving necessary and eternal existence to be comprised in the idea which it has of an all-perfect Being, it ought manifestly to conclude that this all-perfect Being exists "<sup>1</sup> God is conceived as possessed of all perfections. Necessary existence is a perfection. Therefore, God is conceived as necessarily existing, i e, God exists

Clare et distincte the logical criterion of truth, based upon God's veracity.—When I have arrived at the existence of God, I must hold fast by Him in order to have assurance of the truth of every other thing. Every truth ultimately depends on Him. God, as the absolutely perfect Being, must be veracious, for veracity is a perfection. Therefore, all our clear and distinct ideas must be true, for otherwise God would be deceiving us. Thus Descartes establishes clearness and distinctness of knowledge as the logical criterion of truth. In the *Principles*, he has defined this test in the following words.—“I call that clear which is present and manifest to the mind giving attention to it, just as we are said clearly to see objects when, being present to the eye looking on, they stimulate it with sufficient force, and it is disposed to regard them, but the distinct is that which is so precise and different from all other objects as to comprehend in itself only what is clear”<sup>2</sup> A perception may be clear without being distinct, but it cannot be distinct unless it is clear. It must be noticed that Descartes has not made use of the criterion in the foregoing steps, but since having reached it, he proceeds to apply it to the investigation of our knowledge concerning the world

<sup>1</sup> Descartes's *Principles*, Veitch's ed p 199

<sup>2</sup> Descartes's *Principles*, Veitch's ed p. 212.

**Criticism of Descartes' criterion of truth.**—It must be observed that Descartes' logical criterion of truth as consisting in clearness and distinctness is very ambiguous, and cannot always be safely and consistently relied upon. Clearness and distinctness are only relative conceptions. What may appear clear and distinct at a certain time, may, on further consideration and better knowledge and insight into the matter, subsequently turn out to be false and erroneous. "Just as the truth of a clear, sensuous perception, *e. g.* of the sky, may be limited or disproved by scientific insight, so the validity of any stadium of thought may be limited or disproved by a higher one. It is wrong to claim for a lower stadium, which by a natural deception is regarded as the highest so long as no higher one has been reached, that fuller verity that belongs to a higher one."<sup>1</sup> Moreover, Descartes does not clearly distinguish between the notional possibility of truth from its objective reality. When it is said that whatever we clearly and distinctly conceive is true, we may mean that it is possible—*i. e.*, ideal possibility, or we may mean that it is real,—*i. e.*, a matter of fact or existence. The Cartesian criterion may thus be interpreted as referring to the distinctness of the idea as such, or to the distinctness of the judgment by which it is affirmed that certain ideas are objectively true. The overlooking of these distinctions led Descartes to confound ideal possibility with actual reality, and sometimes to identify them, as he did in his famous ontological proof for the existence of God. All these vulnerable points were clearly seen by Hobbes, who, in his controversy with Descartes, made the following pertinent remarks on the Cartesian criterion of truth

1. Ueberweg's *History of Philosophy*, Vol. II., p. 48, note.

"This way of speaking, *a great clearness in the understanding* (as a test of truth), is metaphorical, and therefore not fitted for an argument; for whenever a man feels no doubt at all, he will pretend to this clearness, and he will be as ready to affirm that of which he 'feels' no doubt, as the man who possesses perfect knowledge. This clearness may then very well be the reason 'why a man holds and defends with obstinacy some opinion, but it cannot tell him with certainty that the opinion is true."

### *The existence of Matter.*

Existence of matter and its distinction from mind.—

By the application of the logical criterion, Descartes subsequently establishes the existence of matter. "It cannot be doubted," he says in his *Principles*, "that every perception we have, comes to us from some object different from our mind; for it is not in our power to cause ourselves to experience one perception rather than another, the perception being entirely dependent on the object which affects our senses. It may, indeed, be a matter of inquiry whether that object be God, or something different from God, but because we perceive, or rather, stimulated by the sense, clearly and distinctly apprehend, certain matter extended in length, breadth and thickness, the various parts of which have different figures and motions, and give rise to the sensations we have of colours, smells, pain, &c., God would, without question, deserve to be regarded as a deceiver, if he directly and of himself presented to our mind the idea of this extended matter, or merely caused it to be presented to us by some object which possessed neither extension, figure, nor motion. For we clearly conceive this matter as entirely

distinct from God, and from ourselves, or our mind ; and appear even clearly to discern that the idea of it is formed in us on occasion of objects existing out of our minds, to which it is in every respect similar. But since God cannot deceive us, for this is repugnant to His 'nature, as has already been remarked, we must unhesitatingly conclude that there exists a certain object extended in length, breadth and thickness, and possessing all these properties which we clearly apprehend to belong to what is extended. And this extended substance is what we call body or matter "<sup>1</sup>" This matter is entirely and truly distinct from mind. The one is a thinking and unextended substance ; while the other is unthinking and extended. Mind is always indivisible, for "I can distinguish in myself no parts ; and the faculties of willing, perceiving, conceiving, &c cannot properly be called its parts, as it is the same mind that is exercised (all entire) in all these operations." Matter is always divisible, for "I cannot conceive a corporeal and extended thing, which I cannot easily sunder in thought, and which, therefore, I do not know to be divisible."<sup>2</sup>

Remarks.—Descartes has often been accused, as by Hobbes and other opponents, of arguing in a circle, in accepting the *res cogitans* and the idea of God on the strength of clearness and distinctness of the conception, and subsequently establishing clearness and distinctness as the criterion of truth by the help of God's veracity. But the view, we have taken and adopted in this treatise, of Descartes' procedure in his speculations exonerate him from this charge. Self or *res cogitans* he

1. Descartes' *Principles*, Veitch's ed., pp 232—233

2. Descartes' *Meditation VI.*, Veitch's ed., pp. 161—165.

accepts, because doubt involves thinking, negation, affirmation, i. e., because self-consciousness necessarily posits itself, and not simply because it is self-evident. Thinking substance being thus shown to exist, all its ideas necessarily exist subjectively, though they may or may not be real. The idea of infinite Being is such a subjective idea. Its reality is not assumed, but proved on the ground that the *ideatum* must be adequate to the production of *idens*. If any thing is assumed here, it is the proposition '*ex nihilo nihil fit*,' 'nothing comes out of nothing.' Descartes himself states that, in the order of knowledge, self consciousness may be the premise on which to rest the knowledge of God, whereas, in the order of existence, God serves as the basis of ego.

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## CHAPTER III.

### THEORY OF BEING.

**Substance.**—Descartes' theory of Being comprises his account of substance, uncreated and created, and of attributes and modes. By substance is meant that which so exists that it needs nothing beyond itself for its existence, or, more properly, that which can exist, and be conceived of, without the help of anything else. Hence a *substantia incompleta* is inconceivable; and, strictly speaking, the term can be applied to God alone, since other so called substances, mind and matter, cannot exist or continue in their existence without God's assistance. In a wider sense, however, we can apply the term substance to created things, if they can be conceived of as existing without the help of anything other than God. In this sense we may speak of created substances, and these are two, mind and matter. A substance can be discovered by its attribute only, as of nothing there can be no attribute, property or quality. As a substance, mind is independent of matter, and matter of mind; and not only are they independent of each other, but also of all attributes and modes.

**Attributes**—An attribute is what makes up the essence and nature of a substance. Though possessed of various properties, every substance has one principal property which constitutes its nature or essence, and upon which all others

depend. Thus extension constitutes the nature of corporeal substance, and thought, the nature of thinking substance. Hence it necessarily follows that extension and matter, thought and mind, are co-extensive · wherever there is extension, there is matter ; wherever there is thought, there is mind : space is thus regarded by Descartes as a plenum, and mind as a substance always thinking.

**Modes.**—Modes are changes of state in attributes. The attribute is unchangeable and permanent, the mode or quality is only actual or present and changeable. Modes cannot be conceived without substance, but substance can be thought of without modes. The diverse faculties of thinking, such as imagination, perception, will, &c., are the different modes of thought “I can indeed clearly and distinctly conceive myself as entire without these modes, but I cannot reciprocally conceive them without conceiving myself, that is to say, without an intelligent substance in which they reside”<sup>1</sup> Similarly, the figures, motions and the like, which are conceived to be in extended and corporeal substances, are the modes of extension

**Remark.**—The above definitions were of controlling influence in the subsequent development of the Cartesian philosophy, and specially in the doctrines of Spinoza As the logical outcome of the Cartesian definition of substance, Spinoza reached the one substance, God, divesting matter and mind of all substantiveness, and regarding them as subject to determination in the same way as modes are in the Cartesian system.

1. Descartes' *Meditation II*, Veitch's ed., pp. 157—158.

## CHAPTER IV.

### OBJECTIONS AGAINST THE CARTESIAN PROOFS OF GOD'S EXISTENCE

Objections of various savants appended to the *Meditations*.—Descartes, before the publication of the *Meditations*, invited criticisms and objections from all hands, and collected and divided them into six heads, which, together with his own replies, he published at the end of his treatise. The first set of objections was made by a theologian named Caterus, the second and the sixth were anonymous objections from various hands, the third, fourth and fifth were respectively made by Arnauld, Hobbes and Gassendi. The anonymous objections are very much the statement of commonsense against philosophy, those of Caterus are friendly criticisms on the metaphysical weaknesses of the Cartesian argument from the traditional theological standpoint of the Church, those of Arnauld are an appreciative enquiry into the bearing and consequences of the *Meditations* for religion and morality, while those of Hobbes and Gassendi, the two great apostles of sensualism and materialism, are a keen and unsympathetic attack upon the spiritualism of the Cartesian position from a generally sensualistic and materialistic standpoint. We have summarised below the spirit of some of these objections, without, however, entering into their details; and also added others which modern criticism still urges against the Cartesian proofs, and arranged them under three heads according to the three proofs of Descartes.

Objections against the a' posteriori proof:—Gassendi, Bayle, Ueberweg, Mill, &c.—Descartes' first proof of the existence of God rests upon the idea, of infinity. It must first of all be shown that this idea is a possible idea, and does not contain any contradiction in it. Gassendi, Bayle and some of Descartes' contemporaries directed their attack against the positive conception of the idea of the infinite, and asserted that it is an indefinite or rather a negative idea. Following the same line of argument Ueberweg, Mill and other modern philosophers would account for the idea of the infinite in the following ways.—(1) We may remove limits or bounds from the finite images of extended bodies that we apprehend. This process of removal of limits may be indefinitely extended, so as to lead to an *indefinitum* in place of the *infinitum*. (2) Or again, the infinite may be reached through logical abstraction, by negating finiteness of the bodies we experience. In this case, the infinite is a purely negative idea, and would come under the same class as darkness and silence.

Hamilton, Spencer, &c.—Similarly, Hamilton, Mansel and Spencer in our age contend that the idea of the infinite or absolute Being is an impossible, inconceivable and contradictory idea on the following grounds —(a) A partial comprehension of the infinite gives a partial infinite, which is finite. Thus the human mind never fully comprehends the infinite it can comprehend only the finite. “To say that the infinite can be thought, but only inadequately thought, is a contradiction in adjecto, it is the same as saying that the infinite can be known, but only known as finite.”<sup>1</sup> (b) Again, under the law of relativity of consciousness, concepts that are unrelated and

<sup>1</sup> Hamilton's *Lectures*, vol. II, p. 375.

absolute are impossible. Hence, an absolute apart from the relative, an infinite abstracted from the finite, an uncaused or noumenal substance apart from caused phenomena, must be held to be empty abstraction, unimaginable and inconceivable (c). Thirdly, Hamilton's law of the conditioned, according to which all human thought lies between two opposite poles, both of which are inconceivable, but one of which must be true, is brought forward against the conceivability, though not the real existence, of the infinite. Hamilton regards the idea of the infinite as a purely negative idea. "The finite," he says in his *Lectures on Logic*, "is the only object of real positive thought, it is that alone which we think by the attribution of determinate characters; the infinite, on the contrary, is conceived only by the thinking away of every character by which the finite was conceived. in other words, we conceive it only as inconceivable."<sup>1</sup>

Kant.—Kant considers that the infinite as a mode of quality is simply a category of the understanding, and while it is necessarily applicable to the world of objective phenomena that result from the operation of the understanding upon the world of matter presented to the sense, it has no necessary applicability beyond and outside this realm. How far it is an ontological reality must be critically discussed. In his '*Transcendental Dialectic*' (Chap III, Sec 9), Kant maintains that the idea of an absolutely necessary being is not conceivable at all, much less can it be demonstrated. "To know a thing as necessary, we must know the conditions that make it necessary to conceive the non-existence of that thing as absolutely inconceivable. To use the word unconditioned in

<sup>1</sup> Hamilton's *Lectures*, vol. III., p. 102—3.

order to get rid of all the conditions which the understanding always requires when wishing to conceive something as necessary, does not render it clear to us in the least whether, after that, we are still thinking anything or perhaps nothing, by the concept of the unconditionally necessary." *Covering the*  
*with more*

Reply.—In reply to the objections, Descartes maintains that the infinite has often been confounded with the indefinite, though these two must be carefully distinguished. The *indefinitum* is the negative: it is that of which the limits are not known to us. "Looking to all these things in which in certain senses, we discover no limits, we will not, therefore, affirm that they are infinite, but will regard them simply as indefinite. Thus, because, we cannot imagine extension so great that we cannot still conceive greater, we will say that the magnitudo of possible things is indefinite"<sup>1</sup> The *infinatum* is on the other hand positive, definite and absolute: it is that which has and can have no limit. "We not only discover in Him alone no limits on any side, but also positively conceive that He admits of none"<sup>1</sup> Descartes repeatedly asserts that the infinite is the most positive conception, and we apprehend it in its entirety, and not a part of it. This does not, however, mean that we have an exhaustive knowledge of the infinite. The idea of the infinite, Descartes maintains, is not a mere negation of the finiteness; it is the idea of an objective reality, and is implied as a necessary condition of every other idea. The idea of the finite, on the other hand, is got only by limitation of the infinite. The infinite includes more reality than the finite; it comprehends the finite, and is the positive conception, of which the finite must rather be called the negative. the finite

1. Descartes' *Principles*, Veitch's ed., p. 205.

presupposes the idea of the infinite, and cannot be thought of except in relation to, and in comparison with, it, "I ought never to suppose," says Descartes,<sup>1</sup> "that my conception of the infinite is a negative idea, got by negation of the finite, just as I conceive repose to be merely negation of movement, and darkness merely the negation of light. On the contrary, I see manifestly that there is more reality in the infinite than in the finite substance, and that therefore I have in me the notion of the infinite, *even in some sense prior to the notion of the finite*, or, in other words, the notion of myself in some sense presupposes the notion of God, for how could I doubt or desire, how could I be conscious of anything as a want, how could I know that I am not altogether perfect, if I had not in me the idea of a being more perfect than myself, by comparison with whom I recognize the defects of my own existence?"

Cousin, Calderwood and others also argue against the force of Hamilton's and Spencer's objections, contending that a partially comprehended infinite is not a partial infinite. We cannot fully comprehend any one thing in the universe, much less the infinite Being but the knowledge of the infinite Being is possible, however inadequate and partial it may be. Principal Caird, in his *Philosophy of Religion*, thus meets the Hamiltonian and Spencerian position "The assertion that man's knowledge is limited to the finite and relative would have no meaning save by a tacit reference to an infinite and absolute object. If we know no other than finite and phenomenal existence, then we should never know or be able to characterise them as finite and phenomenal."

1. Descartes' *Meditation III.*, Caird's trans. in *Encyclopædia Britannica*, Vol. V., p. 144. See also Veitch's ed., p. 12b.

**Objections against the cosmological proof.**—Gassendi objected to the cosmological proof on the following grounds—  
 (1) This proof implies the universality and necessity of the causal principle, the truth of which was not established by Descartes. He here makes an unproved assumption, *viz.*, that every existence has a sufficient cause. (2) Secondly, starting from a finite self, as Descartes does, we cannot reach an infinite cause. He, of course, cuts short the *regressus ad infinitum*, by assuming a first cause that is itself uncaused. But this is an indirect conflict with the principle of causation, for if the first cause be phenomenal, it must be caused, and if it be transcendent and unphenomenal, it cannot be reached from the starting point of phenomena.

**Descartes' reply.**—Descartes, in his reply, contends that the principle "*ex nihilo nihil fit*" has been assumed, because it is one which underlies all rational explanations, and is a self-evident truth which requires no proof at all. To deny the truth of this principle is to retard for ever the progress of knowledge and to subvert human understanding by shutting it up in utter darkness. Secondly, the first cause being a substance without beginning, and not a changing phenomenon, it does not demand a cause for its explanation. Still, we may have a cause formalitum, if not efficient, *viz.*, God is self-caused. Lastly, transcendent first cause, which is self-caused, must clothe itself with all perfections, and is therefore infinite, absolute, &c

**Objections against the ontological proof.**—The ontological proof of Descartes has been oftener attacked than any other proofs of his. It raised a storm of controversy among his contemporaries, and it is also the point against which modern criticisms are mostly directed. Descartes himself

anticipated some of these objections, and answered them in his *Meditations*.

**Objections anticipated by Descartes in his Meditations<sup>1</sup>.**—(1) It may be urged against this proof that, though I cannot conceive a mountain without a valley or a triangle without its three angles, yet it does not follow that the mountain or the triangle really exists, so also, though I cannot conceive a God unless existing, yet it does not follow that He exists.

But Descartes, in reply to this, maintains that there is a fallacy in the above argument. Because I cannot conceive a mountain without a valley or a triangle without its three angles, it does not follow that there is any mountain or a triangle, but simply this that the mountain and valley, or the triangle and its three angles, whether they do exist or not, are inseparable from each other. On the other hand, because I cannot conceive God unless as existing, it follows that existence is inseparable from Him, and, therefore, that He really exists. It is not in my power to conceive a God without existence, *i.e.*, a Being supremely perfect, and yet devoid of absolute perfection.

(2) It may again be objected that, if we suppose God to possess all perfections, we must attribute to Him necessary existence, which is a perfection, but my former supposition may be false, so also God may not be necessarily existent.

But Descartes meets this objection by saying that whenever I happen to think of a first and sovereign Being, I am necessitated to attribute to Him all kinds of perfections, though I may not at the same time think each of them in particular; and as soon as I discover that existence is a perfection, I cannot but infer the existence of this first and sovereign

<sup>1</sup> Descartes' *Meditation V*, Veitch's ed., p. 146-7.

Being Descartes here also points out that the idea of God is an innate idea. It is not adventitious, for I have not drawn it from the senses. I see many grounds also that it is not factitious first, because I can conceive no other being than God to whose essence necessary existence belongs; secondly, because, as it is impossible to conceive two or more Gods of this kind, I clearly perceive that the one God must have existed from all eternity and will exist to all eternity; and thirdly, because I apprehend many other properties in God, none of which I can either diminish or change.

**Objections of Caterus, Gassendi, &c.**—Some of Descartes' contemporaries attacked the ontological proof as a mere copy of the old scholastic argument of Anslem, who attempted to prove the absolute reality of God from the mere conception or rather the definition of Him as the most perfect Being. Anslem argued that the conception of a being that exists only in thought cannot be the conception of the most perfect Being, as a still more perfect being can be conceived that exists not only in thought but also in reality. Hence, the conception of God as the most perfect Being implies the absolute existence of that Being. Now, Caterus urged that this argument of Anslem had already been refuted by Gaunilo and Thomas Aquinas, who pointed out that no conclusion could be drawn from the meaning of a word, and that, according to Anslem's argument, the reality of any idea whatever, *e. g.*, that of an island, might be proved, if only the marks of perfection be included in that conception. So also, from the definition of God as the most perfect Being, the ontological argument of Descartes goes on to prove that God is necessarily existent, for necessary existence

is included in the idea of perfection. This so-called "absolute necessity" of God's existence is after all a hypothetical necessity, as it is dependent on the thought of God as the most perfect Being, but it is nowhere shown that God or a most perfect Being must be thought. The reality of the subject of definition must be ascertained before we make a definition as the ground of inference.

**Reply.**—Descartes, however, replies (1) that his argument is not of the nature of a conclusion from the meaning of the word. He predicates necessary existence as an attribute of God; in other words, we think of God as not merely existing, which we do of every thing while we are thinking of it, but as necessarily existing (2) Further, the idea of God or the most perfect Being is an innate idea, and is a necessary thought in my mind, which I can never get rid of with any effort of mine. I can neither make nor unmake, add to, or detract from, it. It is the most positive and certain idea that I have in me (3) And lastly, Descartes points out that some kind of necessary existence must be conceived as the origin and support of contingent existence.

**Kant's objection.**—"The ontological proof," says Kant, "confounds the logical necessity of judgments with absolute necessity of things. That the idea of a triangle involves its three angles, proves only that if there be a triangle, its three angles are given in it by necessity, so also, that the idea of God involves necessary existence, proves only that God, if He exists at all, exists by the necessity of His being. But the link between thought and existence cannot be supplied; existence ought not to be included in any mere conception. All attempts, therefore, to draw reality or real existence out

of mere concepts must necessarily fail. The proposition 'God as an absolutely perfect Being necessarily exists', like the proposition 'every triangle has three angles', expresses an identical judgment. If in it I reject the predicate and retain the subject, there arises a contradiction; and hence I say that the former belongs to the latter necessarily. But if I reject the subject as well as the predicate, there is no contradiction, because there is nothing left that can be contradicted. To accept a triangle and yet to reject its three angles is contradictory, but there is no contradiction at all in admitting the non-existence of the triangle and of its three angles. The same applies to the concept of an absolutely necessary Being. Remove its existence, and you remove the thing itself, with all its predicates, so that a contradiction becomes impossible. If you say, God is almighty, that is a necessary judgment, because almighty cannot be removed, if you accept a deity, that is an infinite Being, with the concept of which that other concept is identical. But if you say, God is not, then neither his almighty, nor any other of his predicates is given. They are all, together with the subject, removed out of existence, and therefore there is not the slightest contradiction in that sentence”<sup>1</sup>

Reply.—On the above reasoning of Kant which is generally accepted as conclusive, Professor Flint<sup>2</sup> makes the following observations — “Kant ought not merely to have asserted, but to have shown, that we can annul the subject in either of the cases mentioned. We obviously cannot I can say ‘there is no triangle,’ but instead of annulling, that implies the idea of a triangle, and from the idea of a triangle it follows that its

<sup>1</sup> *Critique of Pure Reason*, Transcendental Dialectic, Chap III., Sec 2 Flint's *Theorem*, p. 283.

three angles are equal to two right angles. In like manner, I can say 'there is no God,' but that is not to annul but to imply the idea of God, and it is from the idea of God that, according to Descartes, the existence of God necessarily follows. Kant should have seen that the proposition "there is no God" could be no impediment to an argument the purpose of which is to prove that that proposition is a self-contradiction."

Remark.—It is to be remarked here that Hegel, in his rehabilitation of the Cartesian ontological proof against the Kantian attack, attempts to show that in it, as in the demonstration of the existence of self, Descartes scarcely makes use of a syllogism or an inference. At the starting-point he had urged that doubt or negation implies affirmation, and thus thought posits itself necessarily. So, now, in the ontological proof of God's existence, Descartes intends to point out that necessary existence is necessarily in the world of all contingent existence, and that this necessary existence is God.

## CHAPTER V.

### RATIONAL PSYCHOLOGY.

**The *res cogitans* or ego.**—In his account of natura intellectualis as opposed to mechanical world, Descartes starts with ego or *res cogitans*, whose attribute or essence is thought. The soul is always conscious and cannot exist without thought. It is simple and indivisible, and though we speak of a *res*, *intelligence*, *volens*, *imagineus*, *et sentiens*, still it is the same self in different states of activity. The two so-called faculties, intelligence and will, are not independent or disparate: intelligence implies will, for all affirmations depend on volitions; and in the finite human mind, volition depends upon knowledge or conceptions.

**Classification of thought.**—The contents of *res cogitans* may be divided into Ideas and Volitions—the latter comprising all our affections and judgments “All the modes of thinking of which we are conscious may be referred to two general classes, one of which is the perception or operation of the understanding, and the other the volition or the operation of the will. Thus, to perceive by the senses, to imagine, and to conceive things purely intelligible, are only different modes of perceiving, but to desire, to be averse from, to affirm, to deny, to doubt, are different modes of willing.” The perception or intelligence thus includes all our ideas,

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1. Descartes' *Principles*, Veitch's ed., p. 207.

"which are, as it were, the images or representations of things, as when I think (or represent to my mind) a man, a chimera a sky, an angel or God. The will includes all our affections and judgments as when I love, hate, fear, affirm, deny or choose. in these operations though I always apprehend something as the object of my thought, yet I always embrace in thought something more than the representation of the object <sup>1</sup>

**Classification of ideas into innate, adventitious and factitious.**—Psychologically, Ideas are divided into Innate ideas, Adventitious ideas and Factitious ideas. Innate ideas are the activities of the soul itself, and are self-contained. They are the universal and necessary modes of pure thought, and can never be empirically derived, such are the ideas of self, God, good, right, thing, &c, and of other eternal truths and judgments, as those of identity and contradiction, the principle of '*ex nihilo nihil fit*,' &c. In his reply to Regius, Descartes more clearly explains the nature of innate idea, and concedes that this native knowledge is only implicit, and requires definite experiences to elicit it "When I remarked that there were in me certain thoughts which did not proceed from external objects, nor from the determination of my will, but from the faculty of thinking alone which is in me, that I might distinguish the notions or ideas, which are the forms of these thoughts, from others adventitious and factitious, I called them *innate* in the same sense in which we say that generosity is innate in certain families, in others certain diseases, as gout or gravel, not that, therefore, the infants of these families labour under those diseases in the womb of the

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1. Descartes' *Meditation II*, Veitch's ed., pp. 117—118.

mother, but because they are born with a certain disposition or faculty of contracting them." In a letter to the French Translator of the *Principles*, Descartes throws a further light upon his views as to innate ideas as principles of knowledge. "These ideas", he writes, "must be so clear and evident that the human mind, when it attentively considers them, cannot doubt of their truth, in the second place, the knowledge of other things may be so dependent on them as that, though the principles themselves may indeed be known apart from what depends on them, the latter cannot be known apart from the former."

The other two classes, *viz.*, the Adventitious and the Factitious ideas are modes of impure thought or cognition, originating in the confusion wrought upon the soul by contact with the material world. The Adventitious or empirical ideas are those that are derived from the external or sense perception and the internal perception or reflection as the idea of a mount un or a tree, and of our feelings and internal operations. The Factitious ideas are the products of our constructive imagination, and are such as we frame out of ideas already acquired, as the idea of a golden mountain or of a tree with a golden fruit or of a centaur. The following will give a view of the classification of ideas in a tabular form —

Ideas

Pure or Innate Ideas.	Impure Ideas	
(1) Theological, <i>e.g.</i> , Idea of God.	Adventitious or Empirical	
(2) Practical or ethical, <i>e.g.</i> , ideas of right, justice, &c	Factitious or Constructive, the ideas of imagination, <i>e.g.</i> , centaur.	
(3) Speculative or eternal truths or principles, <i>e.g.</i> , "ex-nihilo nihil fit," &c.	Ideas of Sense or external perception, <i>e.g.</i> , pain, &c.	Ideas of Reflection or internal perception, <i>e.g.</i> , pleasure, man, tree, &c.

**Judgments and errors.**—We now proceed to Descartes' account of judgment, which consists in combining ideas. An idea or representation as such is neither right nor wrong. Each mental act is a mental reality about which there can be no dispute. But a judgment, that an idea is in conformity with an external object, is right or wrong. Judgment implies two faculties first, the understanding which grasps the two ideas and their relation; second, the will which chooses that they shall be affirmed or denied of one another. Judgments are right when they are based on clear and distinct ideas. If we would give our assent only to that which we know clearly, we should never make a mistake. But our intelligence being limited and our will being free, we may at pleasure assent to that which is not clearly and distinctly perceived, and thus fall into error or mistake. “Errors thus arise from the fact that I do not restrain the will, which is of much wider range than the understanding, within the same limits, but extend even to things that I do not understand. But if I abstain from judging of a thing when I do not conceive it with sufficient clearness, it is plain that I act rightly and am never deceived. Clear knowledge of the understanding, ought, therefore, always to precede the determination of the will in affirming or denying”<sup>1</sup>. This is Descartes' explanation of erroneous judgments. There is no fear of error in regard to innate ideas or rather innate principles or judgments, and adventitious ideas may be referred to their true *ideata*, if only we rightly use our understanding and will. God is not, therefore, the source of error. It is only the human will, or rather the disparity between free will and limited intelligence, that is the cause of erroneous judgments.

<sup>1</sup> Descartes' *Meditation IV.*, Veitch's ed., pp. 138, 139 40.

Free will.—Freedom of will is, with Descartes, the fundamental point of ethics. In his fourth *Meditation*, Descartes gives a definition of will and freedom. The power of will consists only in this, that we are able to do or not to do something, or rather in this alone that, in pursuing and shunning what is proposed to us by the understanding, we so act that we are not conscious of being determined to a particular action by any external force. A man's will is free when it is determined only by his own conceptions of goodness and truth. To the possession of freedom it is not necessary that I be alike indifferent to each of the two courses; but on the other hand, the more I am inclined towards the one, because I clearly know that in it there is the reason of truth or goodness, the more freely do I choose to embrace it. Perfect human freedom is, therefore, identical with perfect knowledge and acceptance of what is true and good. Still, though a man must act in accordance with what he conceives to be good or true, he has *indifferentia arbitrii* or the liberty of indifference, when he is not compelled to the one side rather than to the other for want of reason, but this is the lowest grade of liberty in man, and manifests the defect of his knowledge rather than the perfection of his will.

## CHAPTER VI.

### ANTHROPOLOGY.

Cartesian dualism of matter and mind, and the explanation of their connection.—The main difficulty with Descartes was an explanation of the connection between mind and body, between the two substances necessarily exclusive as substances and diametrically opposed in their attributes The *natura intellectualis* or the world of mind is self-contained, and forms an interminable chain. thought acting on thought, volition on volition in a rational sequence or order. In the same way, the material world forms a mechanism with its inevitable chain or sequence of motion upon motion, pressure upon pressure, and change upon change. The human soul cannot really act on the body to produce motion in it, as the production of the smallest additional motion would be inconsistent with the first law of nature, viz., that the quantity of motion is always constant, nor can matter be an efficient cause in the world of mind so as to produce sensation and perception. Still, as a matter of fact, it cannot be denied that mind and body form a unity, though only a unity of composition. We do perceive things, and changes in things do follow our volitions. The explanation of this connection between mind and matter becomes the crucial test of the

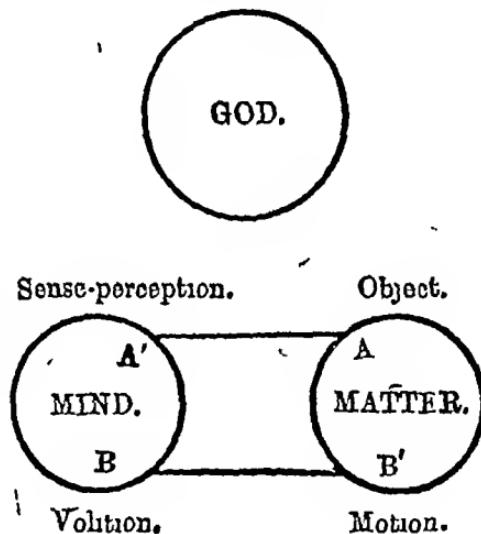
Cartesian philosophy. Descartes has not given us an elaborate and explicit exposition of his position on this point ; but from his various writings, we can gather that he attempted to explain or remove the contradiction by the supposition that, while between mind and matter there is no real nexus of efficient causation, God supernaturally makes use of matter as secondary cause in calling up the sensations and perceptions in the mind, and of will as secondary cause in directing the motion of the body.

To give a clear and obvious view, the different explanations of the connection between mind and matter may be represented by means of diagrams. To illustrate Descartes' view, let three circles represent God, mind and matter respectively. As by the very definition given by Descartes, there can be no direct connection between the circles of mind and matter, God

supernaturally endows them with secondary causation, so that they can act and interact through this derivative power. Thus only can an object A produce sense-perception A' in our mind, and our volition B can produce motion B' in our bodies

**Explanations by Descartes' disciples : Geulincx.**— The theory of the Cartesian dualism and their connection was further developed by Descartes' disciples, chiefly by Geulincx

DESCARTES' SECONDARY CAUSATION.

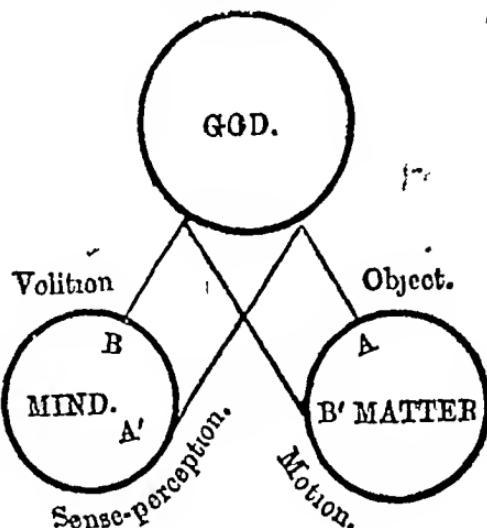


and Malebranche Geulincx first explicitly brought out and stated the full significance of Descartes' explanation, and propounded a theory, known as the theory of Occasional Causes or Divine Assistance. He recognises no secondary causation, as Descartes did. God is the only efficient cause in the world, through whom alone the intercourse between the two contradictory substances, mind and matter, takes place. A secondary cause is, according to Geulincx, nothing but an occasion for the Deity to communicate his impulse to either of the two worlds, material or mental. The Deity himself, on the occasion of certain volitions in our minds, excites the corresponding movements of the body, and, on the occasion of certain changes in our body, He awakens the corresponding feelings in the mind. "External objects determine certain movements in our bodily organs of sense, and these movements are by the nerves and animal spirits propagated to the brain. The brain does not act immediately and really upon the soul, the soul has no direct cognisance of any modification of the brain, this is impossible. It is God himself, who, by a law which He established when movements are determined in the brain, produces analogous modifications in the conscious mind. In like manner, suppose the mind has a volition to move the arm, this volition is of itself inefficacious, but God, in virtue of the same law, causes the answerable motion in our limb. The body is not, therefore, the real cause of the mental modifications, nor the mind the real cause of the bodily movements. The organic changes and the mental determinations are nothing but simple conditions, and not real causes in short, they are occasions or occasional causes."<sup>1</sup>

To illustrate this doctrine by means of diagrams, let God, mind and matter be represented by circles. Now, by the very definition, neither mind can act upon matter, nor matter upon mind. Still, it is a fact that in presence of an object A, there is always a corresponding sense-perception A' in our mind, and a volition B is invariably followed by a corresponding motion E' in our body. Geulincx says that it is God alone who acts in all these cases.

When an object A produces motion in the brain of a man, God seizes that opportunity to call up in his mind the corresponding sense-perception A', similarly, when there is a volition B in the mind of a man, God seizes that opportunity to produce corresponding motion B' in the body.

GEULINCX'S OCCASIONALISM OR DIVINE ASSISTANCE.

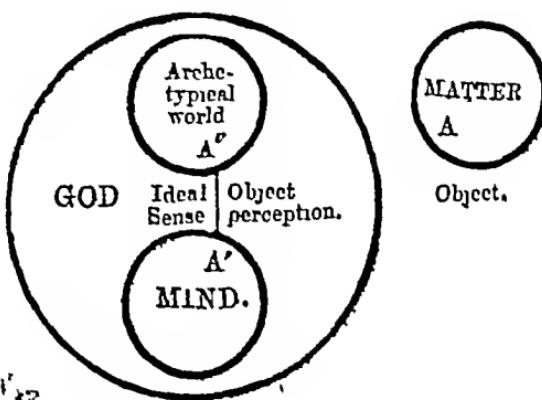


**Malebranche.**—A further attempt at simplification and refinement was made by Malebranche in his celebrated theory of the "Vision of all Things in God." He denies in a manner the independent personality of man. According to him, human spirits are lost or wrapt up in the Divine Spirit, they form a part and parcel of, and are included in, the all-comprehensive spirit of God. Though acknowledging the independent existence of matter, he considers that corresponding to the material world, there is an archetypical world in the

mind of God, which has intelligible extension, and which constitutes the permanent essence and the true reality of things. We can never see the material world directly, it is beyond human comprehension. We, however, being in the spirit of God, can participate in His ideas. We see all things in God through the archetypical world in his mind. He is to us the 'light of all our seeing'. "The soul is united with the substance of God himself, who contains the ideas or perfections of all created beings. It, therefore, sees all ideas in God. God is the place of all spirits as space is the place of all bodies, and we are immediately conscious of the ideas of qualities of body in God himself."<sup>1</sup> In perception, therefore, there is no communication of impulse to, or causal creation in, the human mind. The soul has simply a capacity for ideas, and the human process of ideation is only a communion with, or participation in, the ideas in the Divine mind.

In the illustration of this doctrine by diagrams, the circle of mind is placed within the larger circle of God, of which it forms a part.

MALEBRANCHE'S VISION OF ALL THINGS IN GOD.



<sup>1</sup> *Veitch's Descartes*, Introduction, lxxv.

of God, the mind can participate in the archetypical world, and through it can have an indirect knowledge of the actual material world. Thus, corresponding to an object A, there is an ideal object A" in the mind of God, and human sense-perception A' is only an immediate cognisance of the Divine idea A", through which man can have only an indirect knowledge of A, the actual material object.

Spinoza.—The extreme simplification, or what may rather be called the subversion of the Cartesian doctrine, was made by Spinoza, who resolved the Cartesian dualism into a substantive monism. Starting from his definition of substance as "that which exists in itself, and is conceived *per se*, i.e., the conception of which can be formed without need of the conception of anything else," Spinoza shows that there can be only one substance, *viz.*, God. Extension and thought are only the fundamental attributes of this substance, God, and are, therefore, really the same, SPINOZA'S SUBSTANTIVE MONISM, differing only in appearance or phenomenally. Bodies are the modes of the former, finite thoughts or souls are the modes of the latter. With Spinoza, God alone exists. The concave and convex sides of the circle of God represent mind or thought and matter or extension, and so there is no opposition between them.



The seat of the mind.—Descartes says that although the human soul is united to the whole body, it has nevertheless its principal seat in the brain, where alone it not only

understands and imagines, but also perceives through the medium of the nerves, which are extended like threads from the brain to all the other members. The particular organ through which this intimate connection between mind and body takes place, is, according to Descartes, the *conarium* or the small conical part of the brain, called the pineal gland. The reason for especially locating the mind here is that the single indivisibility of the soul requires a single organ, which should not be in pairs in the nervous system, and should be situated at a central point. Such a position, Descartes maintains, is the *conarium*, where the vital spirits cross and meet, with each other.

**Modes of mind due to the contact with body.**—There are confused thoughts arising from the union or apparent fusion of mind and body. The movements, excited in the brain by the nerves, variously affect the soul or mind which is intimately connected with the brain, according to the diversity of the motions themselves, and produce diverse modes of confused thoughts due to the compound operation of mind and matter. Descartes recognises seven different classes of nerves, five of which are scattered over the five sense-organs, called the external senses, and are employed in the production of the sensations of touch, smell, taste, hearing and sight; the remaining two sets are connected with the internal senses, and are exercised in raising our appetites, passions and affections.

**Sensations: the primary and secondary qualities of objects.**—The flow of vital spirits along the nerves up to the sensorium is a fact of mechanical movement, requiring the intervention of no life and thought, but only of mechanical pressure on the different nerves of the sense-organs by

external objects. But these movements become an occasion or opportunity for the soul for calling forth ideas. Sensations are these confused perceptions of the soul joined to images in the brain, produced by the vibratory motions of the nerves. There are five different kinds of these sensations, *viz.*, those of taste, smell, hearing, touch and sight. It is important to notice here that, according to Descartes, motions of the body alone are sufficient to excite in our minds all sorts of sensations, though these latter do not in any way resemble the motions which give rise to them; and that light, colour, smell, taste, and the tactile qualities of bodies, which are called the secondary qualities, have no resemblance to anything in the objects themselves, but are only sensations in our minds caused by the various modes of the primary qualities of objects, *viz.*, their magnitudes, figures and motions. By our senses we can know nothing in external objects beyond their primary qualities. Of these we have distinct knowledge as they exist in objects, and they are perceived not merely by a single sense, but by several. Such is not the case with the secondary qualities of objects, such as colour, taste and the like. Each of these affects but one of our senses, and calls up a confused image, without giving our understanding any distinct knowledge of what it is in itself.

**Memory.**—The phenomenon of memory is also a mixed mode of the mind. The physical fact here is the traces of movements left on the brain. A fresh flow of vital spirits along the track calls up to the mind ideas resembling those which have previously been experienced.

**Impure ideas.**—The ideas answering to the sensations and their recollections are comparatively confused. They are

either empirical or constructive. These ideas, together with the judgments that combine them in relations of identity and diversity, form the inference or mixed mode of thought or intellect.

**Appetites, affections and passions.**—The natural appetites, such as hunger, thirst, &c., are produced by the stimulation of the nerves, which extend to the stomach, the oesophagus, the fauces, and the other internal parts that are subservient to our natural wants. The emotions or the passions and affections depend upon the nerves which extend to the heart. They arise when the vital spirits, after the soul receives an idea, are forced down to the heart through the pores in the brain, and perturbations are thus produced round the heart and prolonged in waves to the brain. "Thus, when we receive news, the mind first of all judges of it, and if the news be good, it rejoices with that intellectual joy which is independent of any emotion of the body. But as soon as the joy passes from the understanding to the imagination, the spirits flow from the brain to the muscles that are about the heart, and there excite the motion of the small nerves, by means of which another motion is caused in the brain, which affects the mind with the sensation of animal joy. On the same principle, when the blood is so thick that it flows but sparingly into the ventricles of the heart, and is not there sufficiently dilated, it excites in the same nerves a motion quite different from the preceding, which, communicated to the brain, gives to the mind the sensation of sadness. The other movements of the same nerves produce other effects, as the feelings of love, hate, fear, anger, &c." Human passions are thus the conscious emotions

of the mind, which are peculiarly referred to it, and which are caused, sustained and intensified by some motions of the animal spirits. They are intended for the preservation of the body, for inciting us to what is useful, and deterring us from what is hurtful, and they, therefore, only require proper control and direction to be the cause of our greatest pleasure and happiness. Among the primary passions, Descartes recognises six in number, *viz.*, wonder, desire, love, hate, sorrow and joy. Descartes places wonder at the head of his list of passions, because it presupposes all other feelings and passions: it turns to disappointment, sorrow and contempt, or to joy, love and veneration, according to the nature of that which has excited wonder. He calls it the theoretical passion; and its perturbations are confined to the brain, and do not extend to the heart and liver, as in the case of the other passions, called the practical passions. These latter are joined with a tendency to emotion or bodily expression consequent on the excitement of the animal spirits. All other passions, such as fear, hope, &c., are deduced from the primitive six. All these primitive and derivative passions impede clearness and distinctness of intellect; and, on this ground, Descartes sharply distinguishes them from the pure joy of the soul arising from the contemplation of the good or the beautiful or that of God. Virtue consists in the control of the passions by reason, and the desire for the right.

**Will.**—Our volitions, determined by empirical ideas and seeking to produce movement in our bodies, must be regarded as impure or confused modes of willing, in contrast with the pure will to love God, and to know the right, the good and the beautiful. The human will is no cause of the motion in body or matter. It can only impress a direction upon the

motions of the mechanical world. The will is like an engineer directing the machinery and the forces of the mechanism from a central position. If the will could produce or create motion, the law that the *quantum* of motion must remain the same, which is one of the fundamental principles in Descartes' physics, would fall to the ground.

Descartes' automatism.—As an experimental physiologist, Descartes tried to account for the phenomena of organic life on the principles of matter and motion. He conceived the bodily organisms of man and animals to be mechanisms, pure and simple. He denied an independent principle of life, and resolved all the forces, stored up in the living nervous mechanism, into mere motions subtly impressed on the ultimate particles of the blood and the vital spirits, aided by animal-heat or temperature. The facts of respiration, the vascular system and nutrition, together with the phenomena of mentality, were systematically accounted for by him under the laws of mechanical pressure and motion. The result was that the organism was considered as an automaton from the mechanical point of view; though, unlike modern materialists, Descartes acknowledged the activity of the pure spirit or soul seated in the human mechanism, and impressing direction of its own free-will upon its movements or forces. As regards the lower animals, it is often said, that the Cartesians reduced them to mere automata without sensibility or consciousness. Descartes' original position seems to have been a different one. He indeed denied soul (*ratio*) to the lower animals on the ground that they use no language indicative of their intelligence, and that the so-called intelligent actions can all be explained, by

the mechanical principle, to be the direct result of their internal organisms, which, just like the human organisms, Descartes regarded as mere automata. But on the other hand, however, he expressly grants them sensibility, reminiscence, and the passions, stating that it is through the latter that they are capable of being trained. It must be admitted that Descartes is here illogical and inconsistent, for sensations and passions are in his view impure or confused perceptions of the soul due to the contact with matter; and since he denied soul to animals, he was scarcely consistent to grant them sensibility and passions.

## CHAPTER VII.

### ETHICS.

**Good and evil, pleasure and pain.**—Descartes did not formally enter upon a systematic treatment of the philosophy of ethics, and it was only incidentally that he expressed himself on ethical subjects. We can, therefore, get only a very meagre account of his ethical views from the scattered passages and hints in his works. He attempts an explanation of the origin of pleasure and pain, the important elements in almost all ethical theories. Pleasure arises from the consciousness of some perfection, and pain from its absence. From the physiological point of view, pleasure has its rise in the healthy stimulation of organ, and pain arises when the exercise of a function is either overstrained or impaired. Joy and sorrow are the passions corresponding to such pleasure and pain. But there is a purer pleasure or joy arising from the intellectual love to God or the contemplation of absolute perfection, with a corresponding pain and sorrow from the absence of them. These are the pure joys and sorrows of the soul. Good and evil comprehend both the pure and impure varieties of pleasure. Morality, according to Descartes, consists in the possession of the highest and most enduring happiness, which can be attained by a man only by a perfect following of virtue, i. e., by a firm and constant resolution of always using his reason as well as lies in his power, and, in all his actions, of doing what he judges to be the best.

**Virtue.**—Virtue is defined as the control of the passion by wisdom which prefers, to all inferior pleasure, the pleasure arising from rational activity. The *summum bonum* of man is intellectual love to God.

**Relation of will to the motives.**—As primary motives, Descartes recognises six primitive passions: wonder, joy and sorrow, love and hate, and desire. Other motives are derivative. They are concerned with modes of good. Man naturally desires what he conceives at the moment to be good; but his conception may be erroneous, and he may also abuse his freedom of will in preferring a lower to a higher good. We may save ourselves in the hour of temptation by recollecting a higher good which we have previously known, and opposing it to the lower good which attracts us at the moment. This is the proper exercise of our freedom of will and liberty of indifference.

**Relation of moral standard to God.**—Descartes' ethical absolutism is complete. The moral criterion, according to him, has no meaning when applied to the Deity. A thing is good because God wills it. God's will has perfect freedom from necessity. He wills a thing, and therefore it is. Even the eternal verities (whether ethical or intellectual) depend upon God's will.

**Remarks.**—In his ethics, God's will is all in all, and his essence or nature is subordinated to his will; but in his theory of knowing, he finds inherent in the conception of God the attribute of veracity, i. e., God's nature or essence is truth, and therefore, he cannot will what is untrue. Here is an apparent contradiction between his ethics and his theory of knowing.

## CHAPTER VIII.

### PHYSICS.

**Conception of Physics as the science of space and motion.**—The father of modern philosophy was also an eminent physicist and mathematician, and some of the results of his enquiry in these subjects have been afterwards verified and adopted by modern scientists. His physical theories were, however, mainly determined by his metaphysical conception of matter as consisting only in extension. The so-called secondary or sensible qualities are mere sensations in us, having nothing to resemble in the object itself. The subjective character of the secondary qualities is proved by the constant change which takes place in them, without any change of the object in which they are perceived. What is objective in matter, and forms its very essence, is only the attribute of extension. Matter thus conceived was supposed by him to fill all space. A vacuum or space in which there is absolutely no body is, he maintains, repugnant to reason, seeing that it is indeed the same extension which constitutes the nature of both body and space. Space and matter thus coincide; and body is simply so much space distinguished from all sensible qualities and from all forces and motions. In physics, Descartes was the first to attempt "to explain everything on mechanical principles, starting with the hypothesis that a certain quantity of motion has been impressed

on the material universe by God at the first, a quantity which can never be lost or diminished, and that space is an absolute plenum in which motion propagates itself in circles<sup>1</sup>. He discarded all the occult forces and the influences of the spirits and genii of the Scholastics. With him, physics becomes the science of space and motion: it is reduced to mathematics and mechanics. "Give me extension and motion," Descartes exclaims in his *Monde*, "and I will construct the world." He is, therefore, compelled to treat the atoms and limits from a consideration of the property of space, and finds nothing in physical forces beyond motion communicated under mechanical pressure.

**His treatment of space or extension.**—Since space is identical with body, Descartes regarded it as of fundamental importance to investigate and analyse the properties of space. He found that solids, surfaces and lines are all reducible to points; and point is nothing but position in space. Hence, he was led to the conception of the new analytical geometry, which analyses relative position by reference to a fixed origin and fixed axis, and he found not only the well-known properties of lines, circles and the conic sections generally, but even those of curves of the higher orders; and he showed that all these might be analysed and investigated with ease by rendering them to the equational form. As the equations of some of the higher plane curves involve biquadratics, Descartes was led to invent his celebrated method of the solution of biquadratic equations; and he contributed other important theories to the theory of equation, the most important being known as Descartes' rule. While engaged in investi-

<sup>1</sup> Card in *Encyclopædia Britannica*, 9th ed., vol. V., p. 147.

gating equations, he found the necessity of effecting improvements in the objective symbols and notations, and in doing all this he carried on the works of Vietta and Cardan.

**His treatment of motion.**—The fundamental principle of Descartes in this discussion is that the quantity or sum of motion is always the same for us. God, the cause of motion, is unchangeable; so must be the effect. The sum of motion was measured by Descartes by the product of mass and velocity  $M \cdot V$ . This was only natural, for Descartes denied all internal forces, all *vivitira* or *kinetic* energy, to matter. Leibnitz, on the other hand, who considers active force as the essence of his monads, rose to a physico-mechanical view of matter, and employing the conception of *vivitira* or *kinetic* energy, replaced Descartes' measure  $M \cdot V$  by  $M \cdot V^2$ , measuring force itself, which Descartes had not recognised, by  $M \cdot V$ . From the fundamental conception of the unchangeable *quantum* of motion, Descartes deduced the following laws of motion:—(a) that every body continues in its state of rest or motion (law of inertia); (b) that a body which is moved maintains the direction in which it was set in motion, and moves in a straight line so far as it is not affected by any extraneous cause (motion in a straight line); (c) that, if a body, which has been set in motion, strikes another body, a transference of the motion takes place (law of mechanical pressure). In enunciating the laws of motion, Descartes stands midway between Galileo and Newton.

**Descartes' account of creation, and his theory of vortices.**—In his account of creation, Descartes regards matter as of uniform character throughout the universe, and proposes to give a hypothetical explanation of the origin of

the universe on the mechanical principles of matter and motion. According to him, God, in the beginning, divided matter into innumerable parts of different sizes and forms, and communicated to them the different quantities of motion in the most various directions. In the chaotic medley of directions, the moving bodies are some of them consolidated into larger masses, called the third element (the element of earth forming the planet); others into globules, called the second element (the element of air composing the heavens), others again reduced to infinitely subtle matter or ether, which is continuous and forms the essence of the sun and the fixed stars, and are as such called by Descartes the first element (the element of fire). As all the parts of matter, whether great or small, thin or heavy, are endowed with infinite variety of motion, their interaction makes their rectilinear motion impossible, and produces circular motion. Matter was formed into a multitude of vortices, differing in extent, in velocity and in density. The thinner and subtler parts form the real vortices along which are carried the grosser parts situated in them. Our solar system is such a vortex, and the earth and the planets are carried along with it. The easier and quicker motion of the subtler matter in each vortex causes the grosser to deflect towards the centre; and this is the principle by which Descartes explains weight and gravity. In the boldness of conception and all-comprehensiveness of the explanation, Descartes' vortex theory reminds us of the celebrated nebulous theory of Laplace. "It is one of the grandest hypotheses which ever have been formed to account by mechanical processes for the movements of the universe. In the judgment of D'Alembert, the Cartesian theory was

the best that the observations of the age admitted, that its explanation of gravity was one of the most ingenious which philosophy ever imagined "<sup>1</sup> The Cartesian theory of vortices held its own in France in the 17th century, and was not dislodged from its place in the teaching of the schools, until the mathematical researches of Lagrange and Laplace, aided by Voltaire's ridicule and his eulogies on the Newtonian philosophy, completed the overthrow of the Cartesian astronomy.

**Descartes' physical forces.**—Descartes' reduction of physics to mechanics made it natural for him to resolve the different forces of physics into modes of motions—votary (in the case of colour), vibrating (in the case of light), corkscrew pressure (in the case of magnetic force), radiating (in the case of heat, &c.). In optics, Descartes' achievements were—(1) the resolution of light into vibratory motions of ether, or what he called the first element of fire; (2) his precise statement, in mathematical terms, of the laws of refraction, (3) his explanation of the colours of the rainbow, which contained in it the form of the complete explanation of Newton.

In other departments of physics, some of Descartes' guesses and experiments, specially his determination of the specific gravity of the air and his hypothesis of corkscrew pressure in the case of the magnet, which anticipates the recent explanations of electricity and magnetism as phenomena of stress and strain, are the most noteworthy.

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<sup>1</sup> Wallace in *Encyclopædia Britannica*, 9th ed., vol. vii., p. 124.

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